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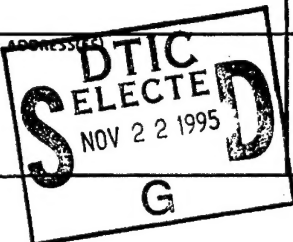
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13. ABSTRACT (Maximum 200 words) SPACECAST 2020 was a Chief of Staff of the Air Force (CSAF)-directed space study, challenged to identify and conceptually develop high-leverage space technologies and systems that will best support the war-fighter in the twenty-first century. This monograph contains the closing remarks made by General Michael P.C. Carns at the NSIA-SPACECAST 2020 Symposium held in November 1994. The SPACECAST 2020 study produced many new ideas and reinforced some old ones. Air University sought to envision the possibilities, capabilities, and technologies the United States will require to exploit the space high ground in pursuit of national security objectives.

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SPACECAST 2020 Symposium**

Washington, D. C.
9-10 November 1994

CLOSING REMARKS

GEN MICHAEL P. C. CARNS, USAF (Ret.)

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Foreword

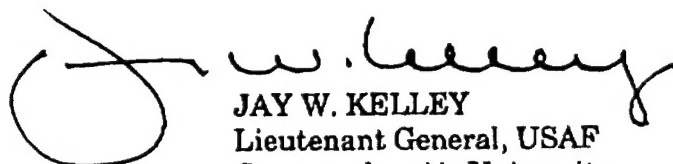
On 22 June 1994 Air University briefed the Air Force chief of staff on the findings of SPACECAST 2020, a year-long study to identify capabilities and high-leverage space technologies to support national security in the twenty-first century. The study process was unique—featuring an original study methodology, a worldwide electronic data call for technology abstracts, and a network of research participants nationwide, which included scientists, technologists, industrialists, intelligence agencies, and representatives from all the service space commands. Hundreds of concepts about emerging technologies sparked an equal number of creative future space applications, which are found in 18 white papers. On 9 and 10 November 1994, the National Security Industrial Association (NSIA) provided a forum to present the first broad briefing to industry in Washington, D.C.

The NSIA is a not-for-profit association of some 375 industrial, research, legal, and educational organizations of all sizes and types. NSIA programs and symposiums focus on the maintenance of a close working relationship between industry and government, in the national interest. The NSIA offered Air University this forum to share the ideas and concepts envisioned in SPACECAST 2020 and the opportunity for open dialogue with industry and the other members of the association. The NSIA SPACECAST Symposium featured unclassified presentations by the study team members over a two-day period, and we were honored to have Gen Michael P. C. Carns (Ret.), former Air Force vice chief of staff, close our conference.

General Carns is a strategic visionary, and in the following remarks he not only captures the thrust of SPACECAST but he also makes a clarion call for immediate change in the way we, as a nation and a military, approach space. He challenged us to pursue several avenues of thought. What are the appropriate roles of the services and

the federal agencies in space? How do we go about operationalizing space to ensure military responsiveness? What steps must we take to bring everyone aboard?

I am pleased to share General Carns's ideas. They are compelling and pertinent to all of us in the business of national security.



JAY W. KELLEY
Lieutenant General, USAF
Commander, Air University

About the Author



Gen Michael P. C. Carns

Gen Michael P. C. Carns was commissioned a second lieutenant in 1959, graduating as a member of the first class at the US Air Force Academy. Following undergraduate pilot training, he was selected to serve as a flight instructor. He then served tours as aide to the commander, Air Reserve Records Center, Denver, Colorado, and aide to the commander, 4th Air Force Reserve Region, Randolph Air Force Base, Texas, before a two-year tour of duty as an air operations officer. He was selected to attend Harvard University, where he earned a master's degree in business administration in 1967.

Following graduate school, General Carns attended fighter training and flew F-4s. From August 1968 to September 1969, he was part of the 469th Tactical Fighter Squadron, Korat Royal Thai Air Force Base, Thailand, where he flew 200 combat missions over Southeast Asia in the F-4E. Returning home to a tour on the Air Staff, he later was selected as aide to the Air Force chief of staff.

General Carns commanded the 613th Tactical Fighter Squadron, 401st Tactical Fighter Wing, Torrejon Air Base, Spain, before he was assigned as special assistant to the chief of staff, Supreme Allied Commander Europe. After completing the Royal College of Defense Studies, the gen-

eral was assigned as deputy commander for operations, 81st Tactical Fighter Wing in Bentwaters, England.

Returning to the United States, he commanded the 354th Tactical Fighter Wing, at Myrtle Beach Air Force Base, South Carolina, before moving to Nellis Air Force Base, Nevada, as commander of the 57th Fighter Weapons Wing. After serving as director of operations, J-3, Rapid Deployment Joint Task Force, he served as both deputy chief of staff for plans and later deputy chief of staff for operations and intelligence at Headquarters Pacific Air Forces, Hickam Air Force Base, Hawaii. Two years later, he assumed command of Thirteenth Air Force, Clark Air Base, Philippines. In 1987, he was selected as deputy commander in chief and chief of staff, US Pacific Command. During Desert Shield/Desert Storm he served as director, the Joint Staff, Washington, D.C. In May 1991, he became the Air Force vice chief of staff, where he served until his retirement on 1 September 1994.

Closing Remarks
NSIA Symposium
10 Nov 94

This is an unusual yet welcome opportunity for me to discuss SPACECAST 2020 and its possible implications for the Air Force and the nation in the near and longer term. The Air Force has conducted a substantial inquiry. Its purpose has clear focus...how best to carry out the Air Force's mission to defend the United States through the control and exploitation of space. In operational terms, that should be rephrased as how best to harness and apply space technologies to support the operational warfighter. Let's pause on that thought for a moment: supporting the operational warfighter.

Begin with the baseline. The Defense Department's functional expertise is national security. Its constitutional responsibility is providing for the common defense. Its customer is its citizenry. The Defense Department has delivered on its contract with the American people.

We—all services—have decisively won this nation's wars, hot and cold. And the American public has unstintingly supported its warriors and provided the necessary resources to do the job—from WWI right on through Desert Storm. We are now in the most significant watershed of this century. We are moving from the conventional confrontations of the bipolar world of two superpowers to the confused and unfocused world of no identifiable national security threat with the irritation and unpredictability of ambiguous regional threats. In such circumstances, one could easily lose focus and momentum, and in so doing, lose the wellspring of our support, the American people.

SPACECAST 2020 has set out to attack this very problem: to link existing and emerging space technologies in a coherent way to the national security mission of the nation. The Air Force undertook SPACECAST 2020, but it should not be seen as Air Force peculiar. This is a defense under-

taking, with defense-wide implications. With that in mind, what are the useful observations for the nation and for this audience?

First, the military needs to appreciate that space is more and more a dual domain of military and civilian activity; we are far from alone in space. It is worth noting that of the one thousand or so US space launches since 1959, the ratio of civilian to military launches has held at a rough 5:4 relationship. Interestingly, the forecast is for divergence of this ratio, favoring the commercial sector. Projects such as Iridium and Teledesic systems will total hundreds of launches should existing lifters be used.

My second observation would be that this increasing commercialization of space is bringing needed rigor to the economics of space launch and orbit. For decades, the US cost to reach space, in constant '93 dollars, has hovered around \$8,000 to \$12,000 per pound to orbit, both in low earth orbit (LEO) and geosynchronous earth orbit (GEO). US systems own the upper end of the scale; the French alternative trends to the lower band of the range. Suffice to say that the pressure is clearly on to find cheaper and better ways to achieve orbit. It takes little vision to see that the market is clearly there.

A third observation is that despite the duality of space and its increasing commercialization, and despite the increased rigor and economic attractiveness of the space alternative, the military is seriously lagging in its operational understanding and appreciation for exploiting the opportunities of space to military advantage. This is a regrettable statement that requires further comment. At least two conditions have brought about this situation. First, although space has been the new frontier, it has been developed and shaped for some three plus decades by functional specialties, not operators. For far too long, military space has been the dominant domain of national-level intelligence, reconnaissance, surveillance, and warning. These are functional areas well known for secrecy and compartmentation, limited oversight, generous funding, restricted access, and narrow application. That must change and is changing. Second, the conditions that allowed this narrow develop-

ment of space utilization also created a protection system—a hard shell—that has prevailed beyond its time, even beyond the end of the cold war. It took a warfighting event—Desert Storm—to crack the shell and force open the door. The warfighter, suddenly in charge, was often amazed at what he discovered behind the door and at what was available for improved battlefield situational awareness, for innovative operational maneuver inside the enemy's decision loop, and for vastly improved targeting and damage assessment tools. In the words of an old saying: once they've been to the big city, it's tough to get them back on the farm. The operator is *not* going back!

That brings us to SPACECAST 2020, the conscious effort to improve the linkage between space technology and opportunity, and operational military mission execution. What we have heard here for the past day and a half is the first cut at a very important redirection for the US Air Force and the military departments in general.

It is eminently clear that military exploitation of space desperately needs warfighter sponsorship and operational focus. The functional specialist's needs in space will continue to be met, but the driver and shaper of space must shift to the operator. So, this is the first task that the USAF must undertake: operational sponsorship of space, a formal commitment, not just a dial-in such as this study but mainstreaming space with all of its aspects into the line Air Force. In space thought and doctrine development, the Air University is the right place. For space requirements, the Air Staff should drive them, but with far greater emphasis. As for space operations, a much more robust effort is due...more about that later.

The good news is that the operationalization of space doesn't require extensive additional research and development. As we heard here yesterday, technologies are largely in hand to undertake leading-edge operational applications. The Black Horse concept illuminated by Maj Chris Daehnick and commented upon by Capt Mitch Clapp is a clear case in point.

Yet, despite this clear operational focus, one should harbor concerns about how SPACECAST 2020 will be handled. The

study is a very competent technical review as well as an operational document. The study's recommendations in integrated demand information architecture, high performance computing, multifunctional space-based laser systems, and materials technology must not become the major focus. That has too often been the mode of the past "techie" take-overs. We must stalwartly lock on to and drive the operational message and vision. And so, putting this all together, the important legacies and influences of space past, the transitional circumstances of space present, and the unique operational opportunities for space future, we should take away three thoughts from this session.

First, SPACECAST 2020 is an important beginning. We are thinking again, thinking operationally about space. This study provides focus, vision, and a beginning roadmap for sustained action. We have a start on the problem. We've defined the terrain and identified a number of fruitful paths to pursue. This beginning must now be converted from a batch task to a streamlined effort. Work it every day, week, month, and year. The Air University has an unprecedented opportunity to recover its leadership and heritage, recapturing the legacy and leadership of the Air Tactics School of the 1930s that developed the concepts of war, which shaped the air war doctrine of World War II and the Air Force of today. The challenge is to shape the USAF space force of tomorrow.

The second footstomping message of this symposium is to get on with operationalization of space...NOW! This former exclusive domain of the specialist must now give way to operational leadership. The core mission must assume daily responsibility for space operations and activity. Unless and until this genuinely happens, that is, space moves to main street, we will continue to mark time and to lose ground. Many are of the mistaken belief that we "operationalized" space when the intercontinental ballistic missile (ICBM) force was reassigned from Air Combat Command (ACC) to Air Force Space Command (AFSC). Wrong. The ICBM force is not a space force. It does not operate in space; it only transits space—a happenstance of ballistics as we fire long-range weaponry over long distances.

Today, space operations are in the hands of the research, development, test, and evaluation (RDT&E) communities—military and civilian (NASA). In the Air Force, Air Force Material Command (AFMC) and contractors do all our space launches—and have been doing so for decades. Never in the history of US military operations have we left such activity in the hands of developers and testers for so long. The inevitable result is a testing mindset in space undertakings—every launch unique, long pad-prep times, heavy contractor reliance, extremely long recycle times, and extremely costly charges. As for NASA, despite an honored heritage of leading-edge work in aerospace technology development, they have opted for routine space operations for two decades. That should be *our* domain; NASA should be concentrating on rolling back aerospace frontiers. Bottom lines: Transfer space launch and control promptly over to operations with AFSPACECOM in charge—NOW. Routinize and standardize the function—blue suit it. Reappraise shuttle operations. The goal should be to transfer launch, space operations, and recovery responsibility to the USAF. NASA would retain responsibility for the shuttle back end when research and development (R&D) is the purpose and would also get on with other R&D such as the space station.

Third, it is time to rethink how we do specialized functions in space. There is huge leverage here with great benefits to all participants, commercial and military. The emerging commercialization of space for *specialized* tasks is shifting the dominance of development and innovation to that sector. The military needs to consider having the commercial sector to perform every task that doesn't require unique military control and handling. This thought, not likely to be popular, particularly in military communications sectors, is an *absolute* necessity. We need to force interoperability, standardization, and functional transparency into military communications and data transfer. Nothing will move this process faster than a requirement to conform to civilian standards when no compelling military requirement can be proven. Today, the Defense Switching Network (DSN) is the Defense Information System Agency's (DISA) responsibility but operated by AT&T

under contract. Why should space communications be any different conceptually?

Obviously, we need to get the word out to inform, to build dialogue, and to stimulate debate. Space needs to be an ongoing issue, in all of its aspects—its vision, its utilization, its roadmap, its military value, its operational uses, its commercial tie-ins, its resource share. We all have a role to play here. Get the SPACECAST message out to your people. Task Air University to help you. Gen [Jay W.] Kelley tells me he's prepared to send teams out upon request to brief military organizations as well as civilian corporations. Take advantage of this special opportunity.

In sum, we should be grateful to the Air University and its 2020 team as well as to NSIA for this important symposium. This is only a beginning. The effort must gather much more momentum and become the persuasive instrument of change that mainlines space with operations in charge. Everyone has a part to play, from Air University to Headquarters USAF to industry.

The test of success will be whether we come together in a year or so to assess progress, revise goals, reset the vision, and set up a new action plan—momentum and movement. What is at stake here is nothing short of sound national policy planning for the next century. Space is no longer just a place; it is now the medium for performing core warfighting tasks. We must convert this powerful vision into mainstream reality with clarity of focus, determination of purpose, and commitment of substantial resources.

We are in charge of our destiny. We need only get on with the task. In closing, thank you for this time. We have time for questions should there be some.

Question and Answer Session

Question: "We hear you on the importance of space. Where do the resources come from?"

Response: "This is, of course, the central question. To downsize further in a declining budget environment, something must be cut. My nomination is: do USAF support far better. Adopt civilian business practices wherever possible; reduce overhead and layering and overcapacity in support areas across the board. Is the money there? Most assuredly so. As we have cut forces on the order of 50 percent, we have cut our support substantially less—in the 20-plus percent range. The money is there to be found; it takes only leadership grit and determination to make it happen."

Question: "The US has a stable of expendable rockets—proven technology for which R&D has been paid. What will drive the change in paradigm for a transatmospheric vehicle (TAV)? Who will pay for R&D and testing? How do we convince industry?"

Response: "We indeed have a proven stable of expendables that have been very reliable over the years. But that is also the problem: new technologies, engines, and fuels are now in the window of availability which, if developed, will put us in the driver's seat as the commercialization of space comes on-line. The dilemma is that of declining military funding and insufficient civilian demand—a classic development transition trough. I believe the answer lies in a trilateral team: defense R&D funding (which has not been cut); NASA R&D monies—this is the core mission for them; and finally, a contribution from the consortium of

industries wishing to share the technology for space applications on a proprietary basis. DOD should lead this effort since we will have a continuing need for better propulsion systems, particularly with the drive to operationalize space."

Question: "General Carns, give us some idea of what you mean by operationalizing space. Didn't SPACECOM do that? How do you affect the culture and mentality?"

Response: "SPACECOM is a first step in the right direction. However, we are far from operationalizing space for the military. The reassignment of the ICBM force from ACC to SPACECOM does not operationalize space. ICBMs do indeed pass through space, but they are certainly not spacecraft. What do we need to do? At least two things promptly: first, the shuttle operation is a natural mission for the military—the front end...stacking, launching, operating, recovering, reprep for launch. The natural and proper NASA mission is the back end; theirs is not the mission of mainline routine flight ops, but research. The second area where the military should move into the driver's seat is the preparation and launch and selective operation of satellites. That's core operation and that's where we should be. If the launch is strictly commercial, start to finish, then contractor operations is an alternative. But when it is government-related or military satellite operations, it should be uniformed—not contract—operations, start to finish. As for the question of culture and mentality—an important issue. It's an issue of vision. As long as we have our fixation on here and now (i.e., terrestrial regional contingency operations to the exclusion of what is rapidly coming upon us), the routine use of space by others, if not us, we are risking taking a back-seat to the there and then. This is not a birth-

right argument but simply one of vision, realizing that this is the operational medium of tomorrow and that we must balance our effort accordingly to bring the future into clearer view and devote the necessary resources and investment to secure preeminence."

Question: "Do you see USAF giving up the F-22 to get the TAV?"

Response: "No. This should not be a question of choosing between two necessary operational capabilities but one of reallocating funds from support and potential sundown military operational capabilities to fund both of these capabilities. It has been said that any investment in an air-breathing system is investment in a sunset system. I emphatically reject that argument today. Military operations for at least the next three decades will be predominantly in the air-breathing medium. We must continue to maintain, train, and operate forces and equipment that is geared to winning 21-0 ballgames, nothing less. Not only is that sound military doctrine, our citizens demand it. When predominance for operations shifts inexorably toward space, our vision, investment, and resource allocation today will guarantee our preeminence in those times tomorrow—and a new TAV is part of that vision. Investment and resource allocation are needed today. Bottom line: we need both."